

What is claimed is:

1. A separating machine for a thinned semiconductor substrate, which separating machine separates a thinned semiconductor substrate from a holding substrate after a semiconductor substrate is bonded to the holding substrate with a thermoplastic resin and a back surface treatment including the thinning of the semiconductor substrate is carried out and which separating machine comprises a pair of vacuum adsorption heads for adsorbing the holding substrate-bonded thinned semiconductor substrate respectively from the holding substrate side and from the thinned semiconductor substrate side opposite to the holding substrate side,

wherein at least one of the vacuum adsorption heads has a moving means for adsorbing and holding the holding substrate-bonded thinned semiconductor substrate in a predetermined position together with the other vacuum adsorption head and at least one of the vacuum adsorption heads has a system for moving in a single swing direction for separation after the above adsorption and holding.

2. A separating machine for a thinned semiconductor substrate according to claim 1, wherein a system for making a starting point for the separation is provided at the single swing side of the vacuum adsorption head.

3. A separating machine for a thinned semiconductor substrate according to claim 2, wherein the starting point for the separation is formed at an orientation-flat portion.

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4. A separating machine for a thinned semiconductor substrate according to claim 2 or 3, wherein the system for

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making a starting point for the separation is a system of pressing with a knife edge.

5. A separating machine for a thinned semiconductor substrate according to claim 2, wherein the system for making a starting point for the separation is composed of a gentle curved surface at least the single swing side of the vacuum adsorption head and the curved surface adsorbs the holding substrate-attached thinned semiconductor substrate to generate a bending stress.

6. A method of separating a thinned semiconductor substrate, comprising bonding and holding a semiconductor substrate to/on the surface of a holding substrate with a thermoplastic resin, carrying out a back surface treatment of the semiconductor substrate, the back surface treatment including the thinning of the semiconductor substrate, and then separating the thinned semiconductor substrate from the holding substrate,

20 wherein the holding substrate-bonded thinned semiconductor substrate is adsorbed and held with a pair of vacuum adsorption heads from the holding substrate side and from the thinned semiconductor substrate side opposite to the holding substrate side, a starting point for separation from one end side of the bonding portion of the holding substrate-bonded thinned semiconductor substrate is made, and the vacuum head is moved in an opening direction from the starting point to separate the thinned semiconductor substrate from the holding substrate.

30 7. A method of separating a thinned semiconductor substrate according to claim 6, wherein the holding

substrate-bonded thinned semiconductor substrate is immersed in an aqueous solution which is composed of a separating solution containing water as a main ingredient and which has a temperature of 25 to 140 °C.

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8. A method of separating a thinned semiconductor substrate according to claim 7, wherein, when an aluminum thin film is present on an exposed portion of the thinned semiconductor substrate, the separating solution contains
10 silicon (Si) in an amount of at least 1 mol/l.

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